REMARKS

Claims 1-10, 12-22 and 24-25 are presently pending in the application. Claims 1-2, 10, 12, 17 and 21 are being amended. Claims 11, 23 and 26-32 are being canceled.

Applicant requests entry of these amendments which are fully supported by the specification and original claims and add no new matter. For example, the recitation of detecting or monitoring radiation "from directly above a surface of the substrate" in claims 1, 10, 17 and 21 is supported at least by figures 1 and 3 which show detection of radiation from a position that is vertically above the surface of the substrate. Reconsideration of the present application in view of the amendments and remarks herein is requested.

Restriction Requirement

In response to the restriction requirement, Applicant elects the claims of Group I, drawn to a method of processing substrates, as defined by the Examiner, namely claims 1-25, with traverse. Claims 26-32 are being canceled, without prejudice or disclaimer, as being drawn to a non-elected invention.

Rejection under 35 U.S.C. 102(e) of Claims 1-7, 10 and 12-16

The Examiner rejected claims 1-7, 10 and 12-16 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 5,770,097 to O'Neill et al. This rejection is traversed.

Claim 1 is not anticipated by O'Neill et al because O'Neill et al does not teach "energizing the gas by passing RF energy through a wall of the process chamber at a power sufficient to couple the RF energy from above an external surface of the

process chamber to the gas inside the process chamber to energize the gas; and detecting radiation from directly above the surface of the substrate after the radiation propagates through the wall and the external surface of the process chamber," as recited in the claim. Instead, O'Neill et al teaches monitoring via viewing ports located in the sides of the chamber (see Figure 1), but fails to teach detecting radiation from directly above the surface of the substrate after the radiation has propagated through a wall and external surface. Furthermore, O'Neill et al does not teach detecting radiation after it has propagated through an external surface through which RF energy was also coupled. Instead, O'Neill et al teaches coupling RF energy through a top portion of a chamber and monitoring through the side of the chamber, as shown in Figure 1. Thus, O'Neill et al does not teach each and every aspect of the claim, and claim 1 and the claims depending therefrom are not anticipated by O'Neill et al.

Claim 10 is not anticipated by O'Neill et al because claim 10 similarly recites "inductively coupling RF energy through a ceiling of the process chamber at a power sufficient to couple the RF energy from above an external surface of [a] the ceiling of the process chamber to the gas inside the process chamber to energize the gas; and detecting radiation from directly above the surface of the substrate after the radiation propagates through a window in the ceiling and the external surface of the process chamber." Thus, as O'Neill et al does not teach detecting radiation from directly above the surface of the substrate, and does not teach detecting radiation after it has propagated through the a ceiling through which RF energy has also been coupled, claim 10 and the claims depending therefrom are not anticipated by O'Neill et al.

The Examiner rejected claims 1-7 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No, 5,846,883 to Moslehi. This rejection is traversed.

Claim 1 is not anticipat d by Moslehi because Moslehi does not teach "en rgizing the gas by passing RF energy through a wall of th process chamber at a power sufficient to couple the RF en rgy from above an external surface of the process

chamber to the gas inside the process chamber to energize the gas," as recited in the claim. Instead, Moslehi teaches sealed plates and a "plasma antenna portion <u>embedded</u> in the middle ceramic ICP or dielectric plate" (column 4, lines 65-66, emphasis added, Figure 1) Since the antenna of Moslehi is embedded in a top portion of the chamber, it does not couple energy <u>from above an external surface of the chamber</u>, and thus Moslehi does not teach the recited step of passing RF energy <u>at a power sufficient to couple energy from above an external surface</u> of the process chamber to the gas inside the process chamber. Accordingly, as Moslehi does not teach each and every aspect of the claim, claim 1 and the claims depending therefrom are not anticipated by Moslehi et al.

<u>Rejection under 35 U.S.C. 103(a) of Claims 8-25</u>

The Examiner rejected claims 8, 9, 11 and 17-25 under 35 U.S.C. 103(a) as being unpatentable over O'Neill et al in view of U.S. Patent No. 5,691,540 to Halle et al. This rejection is traversed.

Claim 1, from which claims 8 and 9 depend, is patentable over O'Neill et al and Halle et al because neither of the references teaches or suggests "energizing the gas by passing RF energy through a wall of the process chamber at a power sufficient to couple the RF energy from above an external surface of the process chamber to the gas inside the process chamber to energize the gas; and detecting radiation from directly above the surface of the substrate after the radiation propagates through the wall and the external surface of the process chamber," as recited in the claim. Instead, as discussed above, O'Neill et al teaches monitoring via viewing ports located in the <u>side</u> of the chamber (see Figure 1), but does not teach detecting radiation from directly above the substrate after the radiation has propagated through an external surface of the chamber and through which RF energy is coupled. Furthermore, it is not obvious to both pass RF energy and detect radiation through the <u>same</u> external surface based on

the teachings of O'Neill et al, because O'Neill et al teaches coupling energy through a top portion of the chamber and detecting radiation through the side.

Halle et al does not make up for the deficiencies of O'Neill et al because Halle et al also does not teach or suggest passing RF energy through an external surface of the process chamber and detecting radiation from directly above the substrate after it has propagated through the external surface. Halle et al teaches a window through which radiation can be focused, (column 3, lines 2-11), but does not teach or suggest coupling RF energy to a gas. Furthermore, there is not motivation to combine the teachings of O'Neill et al with the teachings of Halle et al because neither of the references teaches or suggests <u>both</u> passing RF energy and detecting radiation propagated through the <u>same external surface</u>. O'Neill et al teaches passing RF energy through a <u>top portion</u> of a chamber and detecting radiation through a <u>side</u> of the chamber. Halle et al fails to even teach coupling RF energy. Thus, it is not obvious to modify the teachings of O'Neill et al to devise the claimed method based on the teachings of Halle et al because neither O'Neill et al or Halle et al teach or suggest coupling RF energy and detecting radiation through the same external surface. Accordingly, claim 1 and the claims depending therefrom are patentable over O'Neill et al in view of Halle et al.

Similarly, claim 10, from which claim 11 depends, is patentable over O'Neill et al and Halle et al because neither of the references teach or suggest "inductively coupling RF energy through a ceiling of the process chamber at a power sufficient to couple the RF energy from above an external surface of [a] the ceiling of the process chamber to the gas inside the process chamber to energize the gas; and detecting radiation from directly above the surface of the substrate after the radiation propagates through a window in the ceiling and the external surface of the process chamber," as recited in the claim. Instead, as discussed above, O'Neill et al teaching viewing ports in the <u>side</u> of a chamber, but does not teach both detecting radiation and passing RF energy through a ceiling. Halle et al teaches focusing radiation through a window, but do s not teach that the window is a ceiling, or that RF energy is coupled

through the ceiling. Accordingly, claim 10 and the claims depending therefrom are patentable over O'Neill et al in view of Halle et al.

Similarly, claim 17 is patentable over O'Neill et al and Halle et al because neither of the references teach or suggest "inductively coupling RF energy at a power sufficient to pass the RF energy from above the at least partially domed external surface to the gas inside the chamber; and monitoring radiation from directly above a surface of the substrate that propagates through the at least partially domed external surface during processing of the substrate," as recited in the claim. Neither O'Neill et al or Halle et al teaches or suggests monitoring radiation propagating through an external surface through which RF energy is also coupled. Thus, claim 17 and the claims depending therefrom are patentable over O'Neill et al in view of Halle et al.

Claim 21 is patentable over O'Neill et al and Halle et al because O'Neill et al and Halle et al both fail to teach or suggest "powering an antenna to inductively coupling RF energy at a power sufficient to pass RF energy from outside an external surface of a ceiling of the first enclosure to the process gas inside the first enclosure to energize the process gas; and monitoring a sufficient intensity of radiation from directly above the surface of the substrate from after the radiation has propagated through the ceiling and external surface of the first enclosure and into a second enclosure disposed above the first enclosure to determine a process endpoint," as recited in the claim. Instead, O'Neill et al teaches monitoring via ports in the sides of the chamber, but does not teach or suggest monitoring from directly above the substrate, or monitoring radiation propagating through a ceiling through which RF energy is also coupled. Halle et al teaches a chamber window, through which radiation may be focused (column 3, lines 2-3), but does not teach or suggest inductively coupling RF energy to a gas inside a chamber. Furthermore, O'Neill et al and Halle et al do not teach or suggest monitoring a <u>sufficient intensity of radiation to determine an endpoint</u> of radiation propagating through a ceiling through which RF energy is also coupled. Accordingly, the claimed invention is not obvious over th combination of O'Neill et al and Halle et al,

and claim 21 and the claims depending therefrom are patentable over O'Neill et al in view of Halle et al.

The Examiner rejected claims 8 25 under 35 U.S.C. 103(a) as being unpatentable over Moslehi in view of Halle et al. This rejection is traversed.

Claim 1, from which claims 8-9 depend, is patentable over Moslehi in view of Halle et al because neither of the references teach or suggest "energizing the gas by passing RF energy through a wall of the process chamber at a power sufficient to couple the RF energy from above an external surface of the process chamber to the gas inside the process chamber to energize the gas," as recited in the claim. As discussed above, Moslehi does not teach or suggest the claimed invention because Moslehi teaches an embedded antenna portion, and does not teach or suggest passing RF energy through a wall of the process chamber at a <u>power sufficient to couple RF energy from above an external surface of the process chamber</u> to the gas inside the process chamber. Halle et al does not make up for the deficiencies of Moslehi. Halle et al teaches a window, but does not teach passing RF energy through the window. Accordingly, claim 1 and the claims depending therefrom are patentable over Moslehi in view of Halle et al.

Similarly, claim 10 is patentable over Moslehi and Halle et al because neither of the references teach or suggest "inductively coupling RF energy through a ceiling of the process chamber at a power sufficient to couple the RF energy from above an external surface of the ceiling of the process chamber to the gas inside the process chamber to energize the gas," as recited in the claim. Thus, claim 10 and the claims depending therefrom are patentable over Moslehi in view of Halle et al.

Claim 17 is patentable over Moslehi and Halle because neither of the references teaches or suggests "inductively coupling RF nergy at a power sufficient to pass th RF energy from above the at least partially domed external surface to the gas insid the chamber," as recited in the claim. Instead, Moslehi et al teaches an

embedded antenna portion and Halle et al does not teach or suggest coupling RF energy. Thus, claim 17 and the claims depending therefrom are patentable over Moslehi in view of Halle et al.

Claim 21 is patentable over Moslehi in view of Halle et al because niether of the references teach or suggest "powering an antenna to inductively coupling RF energy at a power sufficient to pass RF energy from outside an external surface of a ceiling of the first enclosure to the process gas inside the first enclosure to energize the process gas," as recited in the claims. Instead, Moslehi teaches an antenna portion that is embedded in a sealed plate that makes up a portion of a wall of the chamber. Thus, Moslehi does not teach inductively coupling at <u>a power sufficient to pass RF energy from outside an external surface of a ceiling of the first enclosure to the process gas</u> inside the first enclosure. Halle et al does not make up for these deficiencies, because Halle et al does not teach or suggest inductively coupling RF energy. Thus, claim 21 and the claims depending therefrom are patentable over Moslehi in view of Halle et al.

CONCLUSION

The Examiner is respectfully requested to reconsider the present rejections and allow the pending claims in view of the remarks and claim amendments provided herein. Should the Examiner have any questions, the Examiner is requested to call the undersigned representative of the Applicant.

Respectfully submitted,

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MARKED-UP COPY OF AMENDED CLAIMS FOR S/N 09/595,778

1. (once amended) A method of processing a substrate, the method comprising:

providing a substrate in a process chamber, the substrate having a surface;

introducing a gas into the process chamber;

energizing the gas by passing RF energy through a wall of the process chamber at a power sufficient to couple the RF energy from above an external surface of the process chamber to the gas inside the process chamber to energize the gas; and

detecting radiation from directly above the surface of the substrate after the radiation propagates [propagating] through the wall and the external surface of the process chamber.

2. (once amended) A method according to claim 1 comprising energizing the gas by powering an antenna external to the process chamber at the power.

10. (once amended) A method of processing a substrate, the method comprising:

placing a substrate in a process chamber, the substrate having a surface;

introducing a gas into the process chamber;

[powering an antenna covering a portion of] inductively coupling RF energy through a ceiling of the process chamber at a power sufficient to couple the RF energy from above an external surface of [a] the ceiling of the process chamber to [couple energy to] the gas inside the process chamber to energize the gas; and

detecting radiation from directly above the surface of the substrate after the radiation propagates [propagating] through a window in the ceiling and the external surface of the process chamber.

12. (once amended) A method according to claim 10 comprising inductively coupling the RF energy by powering an [wherein the] antenna that (1) is substantially non-vertical, or (2) comprises a planar coil.

17. (once amended) A method of processing a substrate, the method comprising:

providing a chamber having [a top] an external surface that is at least partially dome shaped;

providing a substrate in the chamber, the substrate having a surface;

introducing a gas into the chamber;

inductively coupling RF energy at a power sufficient to pass the RF energy from above the at least partially domed external surface to the gas inside the chamber; and

monitoring radiation from directly above a surface of the substrate that propagates through the [top] at least partially domed external surface during processing of the substrate.

21. (once amended) A method of processing a substrate, the method comprising:

placing a substrate in a first enclosure, the substrate having a surface;

introducing a process gas into the first enclosure;

powering an antenna to inductively coupling RF energy at a power sufficient to pass RF energy from outside an external surface of a ceiling of the first enclosure to th process gas inside the first enclosure to energize the process gas; and

monitoring [processing of] a sufficient intensity of radiation from directly above the surface of the substrate from after the radiation has propagated through the ceiling and external surface of the first enclosure and into a second enclosure disposed above the first enclosure to determine a process endpoint.